Enhancing Access to Scientific Models through Standard Web Services, Phase I

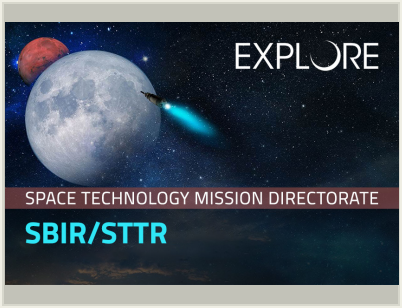
Completed Technology Project (2009 - 2009)

Project Introduction

We propose to investigate the feasibility and value of the "Software as a Service" paradigm in facilitating access to Earth Science numerical models. We envision providing prototype Web-based access to NASA scientific models (GEOS-5, WRF) and their results, via industry-standard service interfaces (OGC's Web Coverage Service, Web Map Service, OPeNDAP) implemented by open-source software tools such as MapServer and THREDDS. These services would allow declarative access to pre-computed model outputs, on-demand (asynchronous or synchronous) model runs, and user-customizable model workflows. These services would use the MAP Mobile Environment Workflow tool and associated templates to encapsulate details of the model software and the computing environment in which it runs. Providing these modeling capabilities as a service, through well-defined, widely-supported Web interfaces, would facilitate loosely-coupled collaborative work among different computing facilities and different disciplines; and it would broaden access to modeling beyond those already "in the know" or qualified to login to a NASA computing resource. We will conduct the study in stages, beginning with Web access to pre-stored model results, followed by on-demand model runs and culminating in service-based workflow customization.

Anticipated Benefits

NASA Earth system models and modeling infrastructure were designed to meet specific needs of modelers, and to support fairly esoteric scientific interests. However, easier access to these models may make them usable outside of the traditional NASA earth science community, in "what if" scenarios and forecasts supporting operational and policy decisions on various time scales. This is likely to attract new users and uses of NASA models and model outputs, in such diverse fields as aviation, weather and climate, agriculture, environmental and ecosystem management, energy / utility industries, real estate, and many others that could benefit from improved access to predictive modeling for decision-making, planning, and management. Much as the wide availability of satellite data in the 1980s, and of digital Census data in the 1990s, spawned a market for repackaging, customizing, and mining public data for use in a variety of settings, easier and broader model access is likely to grow the market for targeted software applications that can harness these models for myriad practical applications. This project aims to provide standard Web service interfaces to NASA's Earth Science models, for use by fellow scientists, decision-makers, and many others. By opening access to its model and computing resources, NASA meets its obligations to serve broader interests (including academic and other agency partners), and grows the number of users and uses of NASA models, thus enhancing the impact and value of these models, and strengthening continued support for high-end computing and modeling. By facilitating access to numerical models through standard, well-known services, NASA also provides a fertile environment in which many different entities [rather than a handful of people "in the know"]



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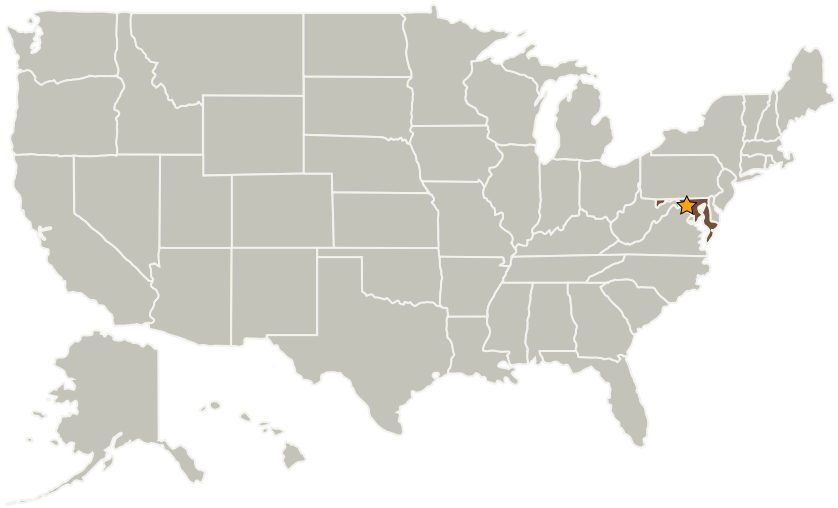
can compete to develop software tools for validation, further analysis, or societal applications. Standard Web interfaces give commercial entities "a leg up," decreasing the time they require to build applications that use models and their outputs. And broader competition, within a standards-based "level playing field," is likely to increase the diversity and quality of software choices available to NASA for use with its models.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Global Science & Technology, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Greenbelt, Maryland

Primary U.S. Work Locations
Maryland

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Gail Mcconaughy

Principal Investigator:

John Evans

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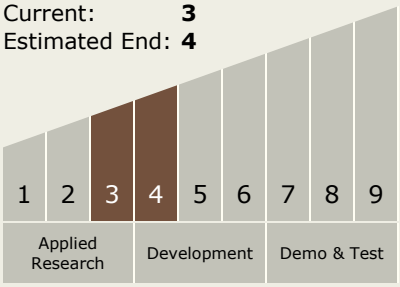
Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.4 Collaborative Science and Engineering